EXACT

ELECTRONICS, INC.

INSTRUCTION MANUAL

MODEL 100

WAVEFORM GENERATOR

INSTRUCTION MANUAL

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WAVEFORM GENERATOR

EXACT ELECTRONICS INC.
455 S.E. 2nd Avenue, Hillsboro, Oregon 97123 • TEL: (503) 648-6661

IF YOUR INSTRUMENT DOES NOT OPERATE

PLEASE

1. Check operating procedure in manual for proper setup.

2. Check fuse and power supply voltages.

3. Call your Exact representative or factory. Instruments returned to the factory will be accepted only if they are sent freight prepaid, unless Exact or factory representative has authorized otherwise.

CLAIM FOR DAMAGED SHIPMENT

The instrument should be inspected as soon as received. If damage has occurred, a claim should be made with the carrier. The claim agent should receive a complete report of damage and a copy sent to Exact. After receiving this report, Exact will advise you of the dispostion of the instrument and arrange for its repair or replacement.

WARRANTY

Exact warrants its instruments to be free from defects in material and workmanship under normal use for a period of twelve months from the original date of shipment. Exact's obligation is limited to repair or replacement.

All repairs and replacements made under this warranty are f.o.b. Exact's factory or designated service depot unless otherwise authorized by Exact. This warranty is made on condition that prompt notice of defect is given to Exact, in writing, within the warranty period and that Exact shall have the sole right to determine whether in fact a defect exists.

This warranty does not apply to any instrument which has been repaired or altered by other than Exact's own service representative so as, in Exact's judgment, to adversely affect it, nor which has been subject to misuse, negligence or accident or which has been operated contrary to sound practice or operating instructions.

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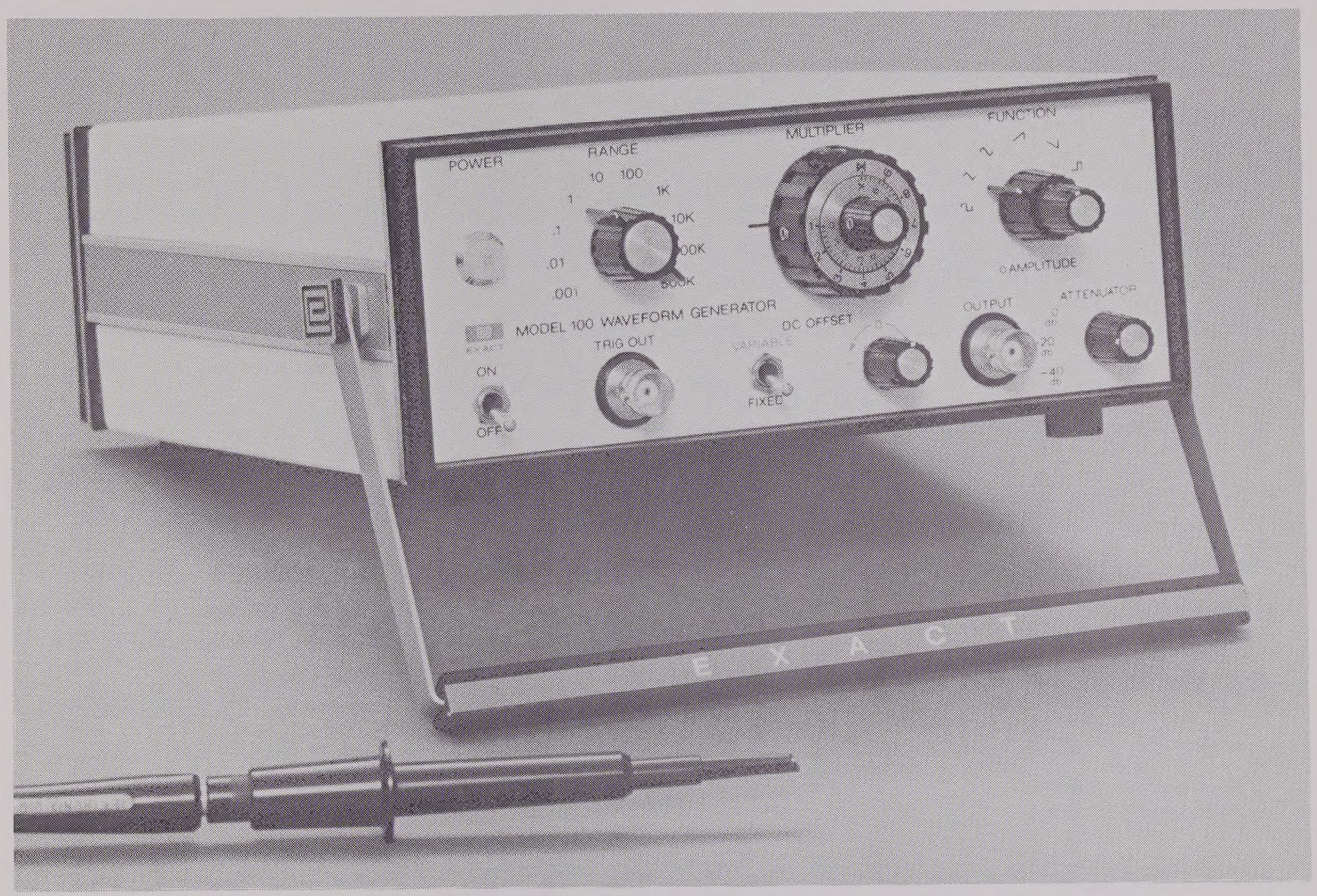
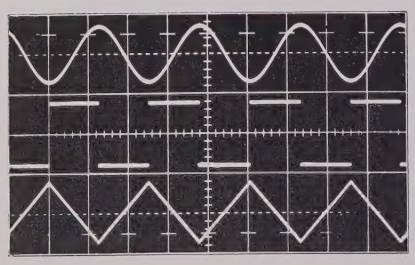
MODEL 100 WAVEFORM GENERATOR

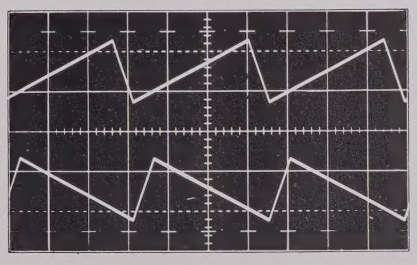


FEATURES

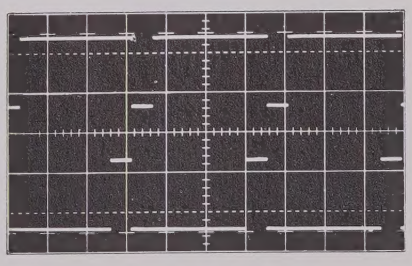
- MINIATURE SIZE
- 15V P-P INTO 50 OHMS, 30V OPEN CIRCUIT
- CALIBRATED OUTPUT ATTENUATOR
- FLOATING OUTPUT PROVISIONS
- 0.001 TO 5MHz FREQUENCY SPAN
- KELVIN-VARLEY FREQUENCY CONTROL
- VARIABLE D.C. OFFSET
- CONVENIENT HANDLE/TILT STAND



Sine, Square and Triangle
(output phase relationship)



Forward and Reverse Ramp



Pulse

Box 160 Hillsboro, Oregon
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EXACT electronics, inc.

GENERAL

The Model 100 miniature waveform generator is a precision source of sine, square, triangle, ramp and pulse waveforms over a dynamic frequency range of 0.001Hz to 5MHz (ramp and pulse limited to 1MHz). With the convenient handle/tilt stand, the Model 100 can be brought to the calibration or repair job as easily as carrying a multimeter.

Frequency is controlled by adjusting a precision Kelvin-Varley divider for greater accuracy, stability and resetability. Output attenuation features a three-position attenuator in 20db steps plus a 30db variable range for 70db of dynamic range. Also featured are D.C. offset fixed at 0V or adjustable ±5V and floating output provision.

SPECIFICATIONS

WAVEFORMS
Sine, square, triangle, ramp and pulse.

FREQUENCY RANGE
0.001Hz to 5MHz, sine, sq, tri.
0.001Hz to 1MHz, ramp, pulse

DIAL ACCURACY (sine, sq, tri)
±3% of setting to 500KHz
±5% of setting to 5MHz

OUTPUT VOLTAGE (max at 1KHz ref.)
15V P-P into 50 ohms
30V P-P open circuit

OUTPUT IMPEDANCE
50 ohms

OUTPUT D.C. LEVEL
0V ±150mv or variable ±5V (open circuit).

OUTPUT ATTENUATION
Three-position attenuator in 20db steps, plus 30db variable range, provides 70db dynamic range.

SYNC OUTPUT (typical)
+1.3V and -1.3V peak (open circuit) occuring at the square rise and fall.

SYNC OUTPUT IMPEDANCE
600 ohms

SINE DISTORTION
<0.5% to 10KHz.
Harmonics at least 40db down from fundamental to 100KHz and 30db down to 5MHz.

SINE FREQUENCY RESPONSE
0.1db to 100KHz
0.5db to 3MHz
2db to 5MHz

SQUARE RESPONSE
<50nsec rise and fall
<5% total aberrations

TRIANGLE and RAMP LINEARITY
99% to 500KHz
95% to 5MHz

JITTER (time)
0.025% (cycle to cycle)

STABILITY	Short Term (10 min.)	Long Term (24 hrs.)
Frequency	0.05%	0.25%
Amplitude } D.C.Level }	0.05% of max. P-P amplitude	0.25%

RAMP FALLTIME
Approximately 15% of total ramp time.

SYMMETRY (time) - Sine, sq, tri.
99.5% to 500KHz
99% to 5MHz

TEMPERATURE RANGE
Operating: 0°C to 50° C
Storage: -40°C to +80° C
All specifications are for +25° C ±5°C

POWER REQUIREMENTS
Input Voltage: 115V or 220V ±10%
Frequency: 50 to 400Hz
Power Consumption: 20W nominal

PHYSICAL CHARACTERISTICS
7-3/8" wide x 2-7/8" high x 8-1/2" deep. Top and bottom covers are easily removable, exposing calibration and circuit areas.
Weight: 5 lbs net, 7 lbs shipping

PRICE

All specifications apply 10% to maximum specified voltage amplitude settings with output terminated into a 50-ohm load.

Due to Exact's continuing policy of product improvement, all specifications and prices are subject to change without notice.

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3.1.0 FRONT PANEL FAMILIARITY (fig. 3.1.1)

1. Power On/Off switch - turns on input power to instrument.
2. Pilot lamp - indicates input power On.
3. Range switch - selects frequency range of output waveform.
4. Multiplier dial - Kelvin-Varley type multiplier provides vernier frequency control of output waveform.
5. Function switch - selects square, triangle, sine, ramp or pulse waveforms.
6. Amplitude control - vernier amplitude adjust of output waveform.
7. Attenuator - selects 20db amplitude steps for clean output waveforms at low amplitude.
8. Output connector - provides 50-ohm output impedance of selected waveform.

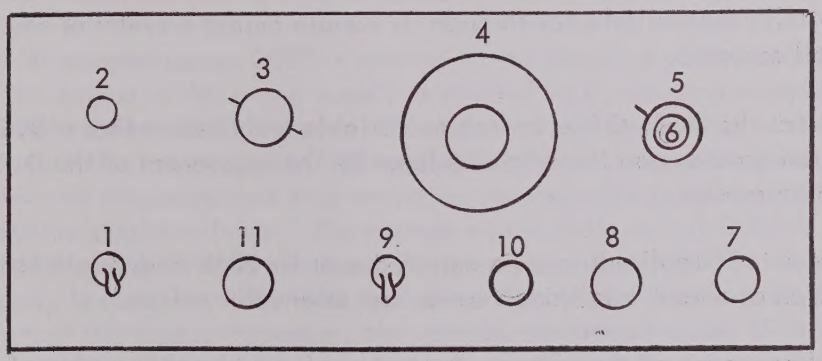


Fig. 3.1.1 Front Panel

9. D.C. Offset switch - selects variable D.C. offset superimposed on output waveform in Variable position or no D.C. offset in Fixed position.
10. D.C. Offset control - selects D.C. offset amplitude in the Variable position.
11. Trigger Out connector - provides trigger output voltage in phase with the square waveform.

NOTE: This instrument is equipped with a floating circuit ground which may be tied to the chassis ground or floated to some other source by the connection of the grounding strap on the rear panel.

3.2.0 FIRST TIME OPERATION

NOTE: Before applying power to the instrument, the input power connection should be checked to be certain the instrument has been wired for the correct power supply voltage. Refer to Power Transformer connections on the power supply schematic diagram (fig. 7.2.1). The correct fuse should be in the rear panel fuse holder as specified in the chart on the instrument rear panel.

1. Plug instrument into source of 110V or 220V 50 to 400 cycle A.C. power and turn on power switch. Set controls as follows:

RANGE switch	100
MULTIPLIER dial	X.0
FUNCTION switch	SINE
AMPLITUDE vernier	MAX CW
D.C. OFFSET switch	FIXED
OUTPUT ATTEN	0db

2. Connect generator output through 50-ohm coaxial cable into 50-ohm coaxial load and the vertical input of a suitable oscilloscope. The instrument should be providing a 1KHz sine waveform at approximately 15V P-P amplitude under these conditions.

3. Switch Function selector through its various output waveforms and observe on the oscilloscope.

4. Switch the D.C. Offset switch to Variable and observe that a D.C. voltage can be superimposed upon the output voltage by the adjustment of the D.C. offset control potentiometer.

5. The output amplitude can be adjusted over its 70db of dynamic range by the combination of output amplitude vernier and attenuator switch.

6. The frequency of the instrument may be selected by the combination of the proper range switch setting and the Kelvin-Varley multiplier dial settings.

NOTE: It is recommended that the rear panel chassis ground and circuit ground connections be connected together with the grounding strap provided unless it is necessary to float the instrument ground.

4.1.0 POWER SUPPLY (figure 7.2.1)

The input power is supplied to the instrument power cable and is applied to a voltage step-down transformer, T901, through a fuse, F901, and input power switch S901. A neon indicator lamp, B901, is across the power transformer primary, indicating when the input power is applied. The secondary of T901 applies a voltage to the rectifier bridge, D901. The output of this rectifier bridge is applied to filter capacitors C910 and C950 which provide a filtered D.C. voltage for the regulated power supply to follow.

Approximately +30V and -30V with respect to circuit ground are developed across these filter capacitors at nominal line voltage. The positive voltage is applied to the pass transistor, Q910. The base of this transistor is controlled by the integrated circuit power supply, Q920. This integrated circuit is a self-contained power supply including an error amplifier, reference voltage power supply and short circuit protection to prevent the power supply from being damaged when the load is short circuited. R910 provides a signal proportional to the output current as a sensing voltage for this short circuit protection. The output voltage of the power supply is applied to the divider network composed of R921 through R923 which develops a feedback voltage to the error amplifier and provides a small adjustment of the power supply output voltage. The power supply delivers +20.50V to the circuitry of the Model 100 function generator.

The -30V developed across C950 is applied to the negative power supply pass transistor, Q960. The output of this power supply is applied to the network composed of R942 through R944 to the +20.5V supply. The output of this network is applied to the differential amplifier composed of Q930 and Q940 which compares the output of this divider network to ground and thus maintains the negative power supply voltage equal to the positive supply voltage. The voltage of the collector of Q930 is further amplified by Q950 and applied to the base of the pass transistor, Q960. The output current of the supply is sensed by R974 and applied to the base of transistor Q970. As the output current of this supply increases, the voltage developed across R974 turns on Q970 which in turn is applied to the base of Q940, turning off the power supply. This provides short circuit protection for the supply in a manner similar to that used in the positive power supply. Diode D974 provides temperature compensation of the short circuit protection since it matches the base-emitter diode voltage of Q970.

4.2.0 BASIC GENERATOR LOOP (figure 7.2.2)

The Model 100 is a closed loop signal generator using the principle of integration to produce a very linear triangle from a square waveform. The triangle is then applied to a bi-stable switch which develops a square waveform. This square waveform is fed back to the integrator input, providing a closed loop system. The integrator is an operational amplifier composed of transistors Q100 through Q180 and their associated circuits. This amplifier is designed using the latest high frequency circuit techniques and has two signal paths, one covering the range of D.C. to 100KHz, the second covering the range above 100KHz. Q110 is a matched pair of junction field effect transistors which have

4.2.0 BASIC GENERATOR LOOP (continued)

a very high input impedance resulting in low offset currents. This allows the amplifier to operate at very low input currents while exhibiting excellent D.C. drift characteristics. The output of this differential amplifier, Q110, is fed to a second differential amplifier, made up of Q120 and Q130. These two stages form the low frequency signal path. The high frequency signal path is made up of Q100, another junction field effect transistor with good high frequency characteristics. These two signal paths are then mixed together in the differential mixer and amplifier Q140 and Q150. The output of this mixer is fed to the complementary output emitter followers, Q170 and Q180. Q160 forms a complementary driver for the emitter followers, thus improving the slewing rate of the amplifier.

The timing or integrating capacitors are connected from the output to the input of the integrating amplifier and are selected by S100C and S100D, depending on the timing range desired. The output of the integrating amplifier is also applied to the input of the level detector made up of transistors Q200 through Q240. Q210 and Q220 form a differential amplifier in the input of the level detector which compares the triangle amplitude to the voltage developed across R220. The emitters of Q210 and Q220 are fed by the current source, Q200, which reduces the common mode gain of the differential amplifier. D211 and D212 limit the collector swing of the amplifier.

The difference voltage developed at the collector of these two transistors is fed to another differential amplifier, made up of Q230 and Q240. The collector swing of Q230 is limited by diodes D230 through D235 to a swing of 4V P-P. The collector of Q240 is limited in swing by diodes D240 through D245 to a voltage of 4V P-P. When Q240 is on, its collector is at +2V and diodes D222 and D224 are on, while diodes D221 and D223 are off. Current then flows through the symmetry adjust potentiometer, R223 and R222, through diode D222 into R220, developing a 1V positive reference voltage at the base of Q220. This voltage is adjustable by the symmetry adjust potentiometer R223 to match the negative voltage when Q240 is off. When Q240 is off, diodes D223 and D221 are on and diodes D222 and D224 are off. The current then flows through R221 and D221 to develop -1V across R220 and thus the base of Q220.

Positive feedback is formed around the loop composed of Q220 and Q240 through diode bridge D221 through D224. This allows the level detector to switch very rapidly from one state to another, generating a square waveform between -1V and +1V at the base of Q220. A triangle is thus generated between -1V and +1V at the base of Q210 and thus -2.5V to +2.5V at the output of the integrator. The network composed of R184, C184 and C185 adjusts the frequency response at the input of the level detector to compensate for the input capacitance of Q210, thus maintaining a constant amplitude triangle at the output of the integrator at all frequencies.

The waveform at the collector of Q230 is applied to another switching bridge composed of D250 through D253 which selects a positive or negative input current to the integrator. The input currents are selected by the function switch, S200 A and B, to provide the necessary slopes to generate symmetrical triangle and non-symmetrical ramp or pulse waveforms. The positive and negative ramp slopes are adjusted by R254 and R244 respectively. The positive and negative reset slopes are adjusted by R250 and R240 respectively. The triangle slopes are adjusted by R242 and R252. When the range switch,

4.2.0 BASIC GENERATOR LOOP (continued)

S100, is in the 500KHz range, the ramp reset resistors are selected, providing higher input currents on these ranges and thus higher frequencies. No ramp or pulse waveforms are available on this range. The output of this switching bridge is applied to the Kelvin-Varley multiplier dial. On the 10Hz through 500KHz ranges the multiplier divider is used as a current divider at the input of the integrating amplifier, thus the current from the switching bridge, D250 through D253, is divided by the ratio set on the Multiplier dial and applied to the integrator. The input current and thus the output frequency are directly proportional to the Multiplier setting. On the slower ranges, 0.001 through 10Hz, the Kelvin-Varley divider is used as a voltage divider. The output of this divider is then applied to further current division by means of R24 through R27 which supplies very low input currents at the long timing ranges. The appropriate current division switching is accomplished by means of S100 A, B and E.

4.3.0 SIGNAL SHAPING AND AMPLIFYING CIRCUITS

The output waveform from the integrator is applied to a unity gain buffer amplifier composed of Q790 and Q795. This waveform is then fed to the sine shaping amplifier in the Sine position and to the 30V output amplifier in the Triangle and Ramp positions through switch S200 C and D. The output of the sine shaping amplifier is also fed to the 30V amplifier in the Sine position. The sine shaping amplifier, composed of Q300 through Q380, is a design very similar to that described in the integrator circuit de - scription except the bipolar transistors Q310A and B are used in the input since this amplifier does not operate at low bias currents. Zener diode D361 in the collectors of the mixing amplifier, Q340 and Q360, plus the bias diodes, D341 and D360, develop a voltage between the bases of the output emitter follower transistors, Q370 and Q380, of approximately 6.3V. This voltage is then developed across the network composed of R371, R373, R375, R377 and R379 through the forward bias diodes, R378 and R388, through resistors R381, R383, R385, R387 and R389. This network applies precision bias voltages to the sine shaping diodes, D370 through D379 and D380 through D389. As the output voltage reaches the bias voltage of the respective diodes, they become forward biased, allowing current to flow in the feedback resistors, R370, R372, R374, R376, R378 and R388. As the output voltage rises, each one of these feedback resistors conducts current in turn, thus changing the gain of the sine shaping amplifier and the slope of the output waveform. This network is in the feedback loop of the sine shaping amplifier, thus its gain is a function of the network resistance or transfer function. Since this transfer function closely approximates a quarter of a sine waveform for an increasing input voltage, a low distortion sine waveform is produced at the amplifier output as a triangle waveform is fed into the input. Since the network is composed of two halves which are identical but of opposite polarity, both halves of the triangle waveform are converted to a half sinusoid. The emitter followers, Q390 and Q395, provide a low output impedance for the sine shaping network which in turn drives the 30V output amplifier. The network composed of L394 and C394 provides peaking at high frequencies to improve the amplitude response of the network. R394 is a sine amplitude potentiometer adjustment which trims the output to 30V P-P at the output connector (into an open circuit).

4.3.0 SIGNAL SHAPING AND AMPLIFYING CIRCUITS (continued)

Transistors Q700 through Q780 form a 30V power amplifier similar in design to those described in the integrator and sine shaping amplifier sections. The triangle, ramp or sine waveform when selected are applied to this amplifier through the output amplitude adjustment potentiometer, R700. This potentiometer adjusts the gain of the power amplifier to approximately 6 and provides a trim of the output amplifier to 30V P-P (15V into 50 ohms). The high frequency adjustment, C782, across the feedback resistor, R782, provides a means to adjust the shape of the output waveform at high frequencies. The output of this amplifier is fed to the selector switch, S200F, and to the output amplitude control, R800, in the sine, triangle and ramp positions.

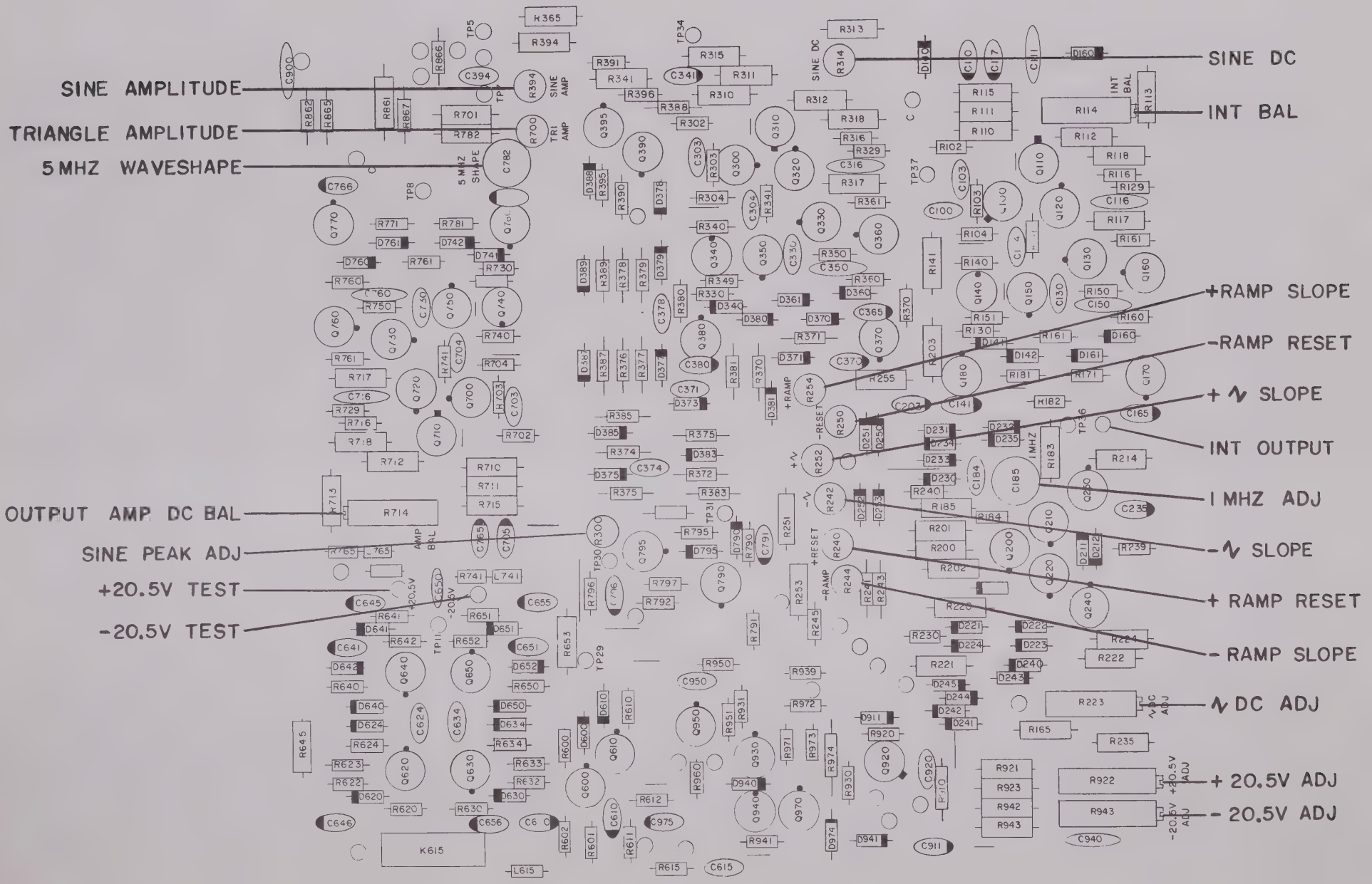
The square waveform output of the level detector is applied to a buffer amplifier composed of Q600 and Q610. This amplifier provides isolation between the signal generating circuits and the square amplifier and trigger output connectors. The output of this buffer is applied directly to the trigger out connector through a network composed of R615 and C615. This output also drives the square amplifier composed of Q620 through Q650 when the reed relay, K615, is closed in the square or pulse position of the function switch. This square amplifier is a fast rise switching type amplifier which provides typical rise times in the 20 nanosecond range at a full 30V P-P amplitude. The input square is applied to the bases of transistors Q620 and Q630. On a positive input, transistor Q620 is turned on, pulling its collector low and turning on transistor Q640. At the same time, transistors Q630 and Q650 are turned off, allowing the output to rise positive. As the input waveform switches negative, the opposite transistors are turned on, allowing the output to go negative. Since this turn on is regenerative, the amplifier switches from one state to the other very rapidly. The output of this squaring amplifier is applied to the function selector switch S200F and the amplitude potentiometer, R800, in the square and pulse positions.

The wiper of this amplitude potentiometer is applied to a unity gain buffer amplifier composed of Q800 and Q810 and their associated circuitry. This amplifier provides current gain and buffering to drive the offset buffer, Q820 through Q830, when the offset switch is in the offset position.

A ±6V bias is developed at the bases of Q820 and Q830 respectively and thus the bias is developed across the offset potentiometer, R822, located in the emitters of these same transistors. The output at the arm of this potentiometer has then a D.C. voltage superimposed upon it, depending upon the setting of this potentiometer.

The output of the offset buffer or the isolation buffer (Q800 and Q810) is applied to the output amplifier by switch S806. This output amplifier composed of Q840 through Q855 is a unity gain power amplifier which supplies suitable current to the output connector to develop the full output of 30V P-P into an open circuit and 15V P-P into 50 ohms. Q840 and Q845 are parallel, supplying positive current, and Q850 and Q855 are in parallel supplying negative current to the output. Resistors R348, R349 and R858 are in parallel and provide a 50-ohm output impedance for the output amplifier. This output is then applied to the output attenuator switch which selects either an output directly to the connector or 20 or 40db of attenuation. R861 and R862 provide for 20db of attenuation, while R865 through R867 provide for an additional 20db of attenuation in the -40db position, providing a range of 40db output amplitude in addition to the 30db provided by the output amplitude vernier.

CALIBRATION


SINE AMPLITUDE
TRIANGLE AMPLITUDE
5 MHZ WAVESHAPE
OUTPUT AMP DC BAL
SINE PEAK ADJ
+20.5V TEST
-20.5V TEST
SINE DC
INT BAL
+RAMP SLOPE
-RAMP RESET
+ ∿ SLOPE
INT OUTPUT
1 MHZ ADJ
- ∿ SLOPE
+ RAMP RESET
- RAMP SLOPE
∿ DC ADJ
+ 20.5V ADJ
- 20.5V ADJ

5.1.0 EQUIPMENT REQUIRED

The following test equipment or suitable equivalents of known accuracy are required for complete calibration of the Model 100 waveform generator.

Oscilloscope, D.C. through at least 50MHz bandwidth, Tektronix 545 with 1A1 and W or 1A5 plug-ins.
Distortion Analyzer, Hewlett Packard 333A
Adjustable line voltage transformer, Superior Powerstat or equivalent
Constant voltage power source accurate to 1mv
Frequency and time interval counter, Fairchild Powerstat or equivalent
Differential or digital voltmeter, Fairchild Model 7000

5.2.0 INITIAL CONTROL SETTINGS

RANGE	100Hz
MULTIPLIER	X.0
FUNCTION	SINE
OFFSET switch	OFF
OFFSET adj	CENTER OF RANGE
OUTPUT ATTEN	0db
OUTPUT VERNIER	FULL CLOCKWISE
POWER switch	ON

5.3.0 CALIBRATION

1. Connect DVM or differential voltmeter to +20.5V test point and adjust +20.5V adjust for +20.5V ±10mv.
2. Connect DVM to -20.5V test point and adjust -20.5V adjust for -20.5V ±10mv.
3. Recheck +20.5V and adjust if necessary.
4. Recheck -20.5V.
5. Connect scope with W or 1A5 plug-in to integrator output and adjust triangle D.C. balance for equal positive and negative peaks (±5mv).
6. Connect counter to output connector, set function switch to positive pulse.
7. Set positive ramp slope for 850µsec on counter (time interval mode).
8. Set positive ramp reset for 150µsec on counter.
9. Set function selector to negative pulse.
10. Adjust negative ramp slope for 850µsec.
11. Adjust negative ramp reset for 150µsec.

5.3.0 CALIBRATION (continued)

12. Set selector switch to square.

13. Adjust positive and negative slope adjustments for 500μsec (time interval).

14. Set range to 0.1Hz. Check symmetry (difference in positive and negative triangle slopes.

15. Set Multiplier to 1.0.

16. Adjust integrator balance adjust for symmetry.

17. Repeat steps 5 through 16.

18. Set function selector to triangle.

19. Connect output to scope (terminate cable in 50Ω load).

20. Adjust triangle amplitude. Adjust for 15V P-P.

21. Set function selector to sine.

22. Connect terminated output to harmonic anaylzer and adjust sine D.C. adjust and sine peak adjust for minimum distortion.

23. Connect terminated output to scope and adjust sine amplitude for 30V P-P.

24. Adjust output D.C. balance for equal positive and negative peaks.

25. Set function selector to square, output vernier to minimum.

26. Set range selector to 100KHz, multiplier to 1.0.

27. Adjust 100KHz. Adjust for 100KHz on counter.

28. Set multiplier to X.0.

29. Adjust 1MHz. Adjust for 1MHz on counter.

30. Set range to 500KHz, multiplier to 1.0.

31. Adjust 500KHz. Adjust for 500KHz on counter.

32. Set multiplier to X.0 and check for 5MHz ±5%.

33. Compromise between 32 and 29 if necessary.

34. Set output attenuator clockwise and check timing at 5MHz on sine, square and triangle waveforms. Should be 5MHz ±5% on each waveform.

5.3.0 CALIBRATION (continued)

35. Set range to 1KHz.

36. Adjust multiplier for 1.5KHz on counter.

37. Rotate knob on shaft until 0.5 lines up with 1.0 on center knob and tighten set screws.

PARTS LIST

CODE LIST OF MANUFACTURERS

00136 McCoy Electronics, Mt. Holly Springs, Pa.
00656 Aerovox Corp., New Bedford, Mass.
00779 Amp, Inc., Harrisburg, Pa.
00853 Sangamo Electric Co., Ordill Div., Marion, Illinois
01121 Allen Bradley Co., Milwaukee, Wisc.
01281 TRW Semiconductors, Inc., Lawndale, Calif.
01295 Texas Inst., Inc., Transistors Prod. Div., Dallas, Texas
01349 The Alliance Mfg. Co., Alliance, Ohio
01561 Chassi-Trak Corp, Indianapolis, Indiana
01961 Pulse Engineering Co., Santa Clara, Calif.
02114 Ferroxcube Corp. of America, Saugerties, N.Y.
02660 Amphenol-Borg Electronics Corp., Chicago, Illinois
02735 Radio Corp of America, Semiconductor and Materials Div., Somerville, N.J.
02777 Hopkins Engineering Co., San Fernando, Calif.
03508 General Electric Semiconductor Prod., Syracuse, N.Y.
03797 Eldema Corp., El Monte, Calif.
03877 Transitron Electronic Corp, Wakefield, Mass.
03888 Pyrofilm Resistor Co., Morristown, N.J.
04009 Arrow, Hart and Hegeman Elect Co., Hartford, Ct.
04062 Elmenco Products Co., New York, NY
04651 Sylvania Electronic Products, Inc., Electronic Tube Div. Mt. View, California
04713 Motorola, Inc., Semiconductor Prod. Div., Phoenix, Ariz.
05277 Westinghouse Electric Corp., Semiconductor Dept, Youngwood Pa.
05347 Ultronix, Inc., San Mateo, California
05820 Wakefield Engineering, Inc., Wakefield, Mass.
07115 Corning Glass Works, Electronic Components Dept, Bradford, Pa.
07126 Digitran Co., Pasadena, Calif.
07137 Transistor Electronics Corp., Minneapolis, Minnesota
07138 Westinghouse Electric Corp., Elect. Tube Div., Elmira, N.Y.
07263 Fairchild Semiconductor Corp., Mountain View, Calif.
07910 Continental Device Corp., Hawthorne, California
08718 Cannon Electric Co., Phoenix Div., Phoenix, Ariz.
08792 CBS Electronics Semiconductor Operations, Div. of C.B.S., Inc., Lowell, Massachusetts
09569 Mallory Battery Co. of Canada Ltd., Toronto, Ontario, Canada
10597 Exact Electronics, Inc., Hillsboro, Oregon
11236 CTS of Berne, Inc., Berne, Indiana
11237 Chicago Telephone of Calif., Inc., S. Pasadena, Calif.
11534 Duncan Electronic, Inc., Santa Ana, Calif.
11711 General Instrument Corp., Semiconductor Div, Newark NJ
12697 Clarostat Mfg. Co., Dover, N.H.
13103 Thermalloy, Dallas, Texas
14655 Cornell-Dubilier Elec. Corp., S. Plainfield, N.J.
16352 Computer Diode Corp., Lodi, N.J.
16758 Delco Radio Div of G.M. Corp., Kokomo, Indiana
17474 Tranex Company, Mountain View, Calif.
19701 Electra Manufacturing Co., Kansas City, Mo.
21520 Fansteel Metallurgical Corp., N. Chicago, Ill.
24446 General Electric Co., Schenectady, N.J.
24455 G.E.Lamp Div. Nela Park, Cleveland, Ohio
28480 Hewlett-Packard Co., Palo Alto, California
37942 P.R.Mallory and Co., Inc., Indianapolis, Indiana
44655 Ohmite Mfg. Co., Skokie, Illinois
49956 Raytheon Company, Lexington, Mass.
54294 Shallcross Mfg. Co., Selma, N.C.
55026 Simpson Electric Co., Chicago, Ill.
55933 Sonotone Corp., Elmsford, N.Y.
56289 Sprague Electric Co., North Adams, Mass.
59730 Thomas and Betts Co., Elizabeth, N.J.
60741 Tripplett Electrical, Inc., Bluffton, Ohio
61637 Kemet, Union Carbide Electronics, Greenville, S.C.
63743 Ward Leonard Electric, Mt. Vernon, N.Y.
65092 Weston Inst. Div. of Daystrom, Inc., Newark, N.J.
70563 Amperite Co., Inc., New York, N.Y.
71218 Bud Radio, Inc., Cleveland, Ohio
71400 Bussmann Fuse Div. of McGraw-Edison Co, St.Louis,Mo.
71450 CTS Corp., Elkhart, Indiana
71468 Cannon Electric Co., Los Angeles, Calif.
71482 C. P. Clare and Co., Chicago, Illinois
71590 Centralab Div of Globe Union, Inc., Milwaukee, Wisc.
71785 Cinch Mfg. Corp., Chicago, Illinois
72619 Dialight Corp., Brooklyn, N.Y.
72699 General Instrument Corp., Semiconductor Div., Newark NJ
72758 Girard-Hopkins, Oakland, Calif.
72928 Gudeman Co., Chicago, Illinois
72982 Erie Resistor Corp., Erie, Pa.
73138 Helipot Div. of Beckman Inst. Inc., Fullerton, Calif.
73445 Amperex Electronic Co., Div of North American Phillips, Hicksville, N.Y.
73490 Beckman Helipot Corp., S. Pasadena, Calif.
73506 Bradley Semiconductor Corp., Hamden, Ct.
74868 R.F. Products Div. of Amphenol-Borg, Danbury, Ct.
74970 E.F. Johnson Co., Waseca, Minnesota
75042 International Resistance Co., Philadelphia, Pa.
75173 Jones, Howard B., Div. of Cinch Mfg. Corp., Chicago, Ill
75378 James Knights Co., Sandwich, Ill.
75382 Kulka Electric Corp., Mt. Vernon, N.Y.
75915 Littlefuse, Inc., Des Plains, Ill.
76487 James Millen Mfg. Co., Malden, Mass.
76493 J. W. Miller Co., Los Angeles, Calif.
76545 Mueller Electric Co., Cleveland, Ohio
76854 Oak Manufacturing Co., Crystal Lake, Ill.
77068 Bendix Pacific Div of Bendix Corp., N. Hollywood, Cal.
77221 Phaostran Inst and Elec Co., S. Pasadena, Calif
77764 Resistance Products Co., Harrisburg, Pa.
78290 Struthers-Dunn, Inc., Pitman, N.J.
78488 Stackpole Carbon Co., St. Marys, Pa.
78553 Tinnerman Products, Inc., Cleveland, Ohio
80207 Unimax Switch, Div. of W.L. Maxson Corp., Wallingford, Ct.
80223 United Transformer Corp., New York, N.Y.
80294 Bourns Laboratories, Inc., Riverside, Calif.
80640 Stevens, Arnold, Co., Inc., Boston, Mass.
81073 Grayhill Co., LaGrange, Illinois
81095 Triad Transformer Corp., Venice, Calif.
81312 Winchester Electronics Co., Inc., Norwalk, Ct.
81483 International Rectifier Corp., El Segundo, Calif.
81541 The Airpax Products Co., Cambridge, Mass.
82219 Sylvania Electric Prod., Inc., Electronic Tube Div., Emporium, Pa.
82647 Metals and Controls, Inc., Div of Texas Instruments Inc., Spencer Products, Attleboro, Mass.
82893 Vector Electronic Co., Glendale, Calif.
83186 Victory Engineering Corp., Springfield, N.J.
83298 Bendix Corp., Red Bank Div., Red Bank, N.J.
83330 Smith, Herman H. Inc., Brooklyn, N.Y.
83594 Burroughs Corp., Electronic Tube Div., Plainfield N.J.
83740 Eveready Battery, New York, N.Y.
84171 Arco Electronics, Inc., New York, N.Y.
86684 Radio Corp of America, RCA Electron Tube Div., Harrison NJ
88140 Cutler-Hammer, Inc., Lincoln,Ill.
88220 Gould-National Batteries, Inc., St. Paul, Minn.
89665 United Transformer Co., Chicago, Ill.
91418 Radio Materials Co., Chicago, Ill.
91506 Augat Brothers', Inc., Attleboro, Mass.
91637 Dale Electronics, Inc., Columbus, Nebraska
91662 Elco Corp., Philadelphia, Pa.
91836 Kings Electronics, Inc. Tickahoe, N.Y.
91929 Minneapolis-Honeywell Regulator Co, Microswitch Div., Freeport, Ill.
93332 Sylvania Electric Prod., Inc. Semiconductor Div., Woburn, Mass
93410 Stemco Controls Div. Essex Wire Corp., Mansfield, Ohio
94145 Raytheon Mfg. Co., Semiconductor Div., Newton, Mass.
94154 Tung-Sol Electric, Inc., Newark, N.J.
94222 Southco Div of S. Chester Corp., Lester, Pa.
94310 Tru Ohm Prod., Div. of Model Engineering and Mfg., Chicago, Ill.
94696 Magnecraft Elect Co., Chicago, Ill.
95203 Philbrick Researchers, Inc., Boston, Mass.
95354 Method Mfg. Co., Chicago, Ill.
95712 Dage Electric Co., Inc., Franklin, Ind.
97966 CBS Electronics, Div. of C.B.S., Inc., Danvers, Mass.
97979 Reon Resistor Corp., Yonkers, N.Y.
98278 Microdot, Inc., S. Pasadena, Calif.
98291 Sealectro Corp., Mamaroneck, N.Y.
98925 Clevite Transistor Prod., Div. of Clevite Corp., Waltham, Mass.
98978 International Electronic Rsch Corp., Burbank, Calif.
99313 Varian Associates, Palo Alto, California
100000 Exact Electronics, Inc., Hillsboro, Oregon
100001 Kemet Div., Union Carbide, Greenville, S.C.
100002 Dixon Electronics Corporation, Scottsdale, Ariz.
100005 Alco Electronic Products, Inc., Lawrence, Mass.
100006 Leecraft Mfg. Co., Inc., Long Island City, N.Y.
100010 Siliconix, Inc., Sunnyvale, Calif.
100011 Almelco Semiconductor, Mt. View, Calif.

MODEL 100

PART	DESCRIPTION	EXACT NO	MFG
B901	PILOT LIGHT	1360045	100005
C010	CAPACITOR, 5.5-18PF TRIM	2810011	72982
C011	CAPACITOR, 47PF MICA	2810532	853
C012	CAPACITOR, 5.5-18PF TRIM	2810011	72982
C013	CAPACITOR, 68PF MICA	2810523	853
C014	CAPACITOR, TIMING SET	2950000	10597
C100	CAPACITOR, 3PF MICA	2810500	853
C103	CAPACITOR, 100PF MICA	2810537	853
C104	CAPACITOR, 5000 PF DISCAP	2830011	91418
C110	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C111	CAPACITOR, 0.1 UF DISCAP	2830002	56289
C116	CAPACITOR, 0.01 UF DISCAP	2830005	91418
C117	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C130	CAPACITOR, 1000 PF DISCAP	2830000	91418
C141	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C150	CAPACITOR, 0.01 UF DISCAP	2830005	91418
C165	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C184	CAPACITOR, 120PF MICA	2810534	853
C185	CAPACITOR, 5.5-18PF TRIM	2810011	72982
C203	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C235	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C303	CAPACITOR, 100PF MICA	2810537	853
C304	CAPACITOR, 5000 PF DISCAP	2830011	91418
C316	CAPACITOR, 0.01 UF DISCAP	2830005	91418
C330	CAPACITOR, 1000 PF DISCAP	2830000	91418
C341	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C350	CAPACITOR, 0.01 UF DISCAP	2830005	91418
C365	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C370	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C374	CAPACITOR, 12PF MICA	2810541	853
C376	CAPACITOR, 12PF MICA	2810541	853
C378	CAPACITOR, 8PF MICA	2810535	853
C380	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C394	CAPACITOR, 22PF MICA	2810530	853
C600	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C610	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C615	CAPACITOR, 5000 PF DISCAP	2830011	91418
C616	CAPACITOR, 0.05 UF DISCAP	2830010	91418
C622	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C624	CAPACITOR, 7PF MICA	2810536	853
C632	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C634	CAPACITOR, 7PF MICA	2810536	853
C641	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C645	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C651	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C655	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C703	CAPACITOR, 100PF MICA	2810537	853
C704	CAPACITOR, 5000 PF DISCAP	2830011	91418
C711	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C716	CAPACITOR, 0.01 UF DISCAP	2830005	91418
C717	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C730	CAPACITOR, 1000 PF DISCAP	2830000	91418
C730	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C741	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002

MODEL100 CONTINUED

PART	DESCRIPTION	EXACT NO	MFG
C750	CAPACITOR, 0.01 UF DISCAP	2830005	91418
C765	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C782	CAPACITOR, 2-8PF TRIM	2810009	72982
C791	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C796	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C800	CAPACITOR, 1000 PF DISCAP	2830000	91418
C804	CAPACITOR, 1MFD 35V	2900046	56289
C810	CAPACITOR, 1000 PF DISCAP	2830000	91418
C814	CAPACITOR, 1MFD 35V	2900046	56289
C820	CAPACITOR, 1500 PF DISCAP	2830012	91418
C821	CAPACITOR, 1MFD 35V	2900046	56289
C830	CAPACITOR, 1500 PF DISCAP	2830012	91418
C831	CAPACITOR, 1MFD 35V	2900046	56289
C840	CAPACITOR, 0.05 UF DISCAP	2830010	91418
C841	CAPACITOR, 1MFD 35V	2900046	56289
C842	CAPACITOR, 1000 PF DISCAP	2830000	91418
C842	CAPACITOR, 1000 PF DISCAP	2830000	91418
C846	CAPACITOR, 1MFD 35V	2900046	56289
C850	CAPACITOR, 0.05 UF DISCAP	2830010	91418
C851	CAPACITOR, 1MFD 35V	2900046	56289
C852	CAPACITOR, 1000 PF DISCAP	2830000	91418
C852	CAPACITOR, 1000 PF DISCAP	2830000	91418
C856	CAPACITOR, 1MFD 35V	2900046	56289
C900	CAPACITOR, 0.05 UF DISCAP	2830010	91418
C910	CAPACITOR, 2500MFD 35V	2900034	853
C911	CAPACITOR, 6.8 MFD 35 VOLT	2900043	100002
C920	CAPACITOR, 470PF MICA	2810539	853
C940	CAPACITOR, 0.05 UF DISCAP	2830010	91418
C950	CAPACITOR, 2500MFD 35V	2900034	853
C950	CAPACITOR, 270PF MICA	2810540	853
D140	DIODE, 1N963	1520963	4713
D141	DIODE, 1N914	1520914	7910
D142	DIODE, 1N914	1520914	7910
D160	DIODE, 1N963	1520963	4713
D161	DIODE, 1N914	1520914	7910
D162	DIODE, 1N914	1520914	7910
D201	DIODE, 1N914	1520914	7910
D211	DIODE, 1N914	1520914	7910
D212	DIODE, 1N914	1520914	7910
D221	DIODE, 1N914	1520914	7910
D222	DIODE, 1N914	1520914	7910
D223	DIODE, 1N914	1520914	7910
D224	DIODE, 1N914	1520914	7910
D230	DIODE, 1N914	1520914	7910
D231	DIODE, 1N914	1520914	7910
D232	DIODE, 1N914	1520914	7910
D233	DIODE, 1N914	1520914	7910
D234	DIODE, 1N914	1520914	7910
D235	DIODE, 1N914	1520914	7910
D240	DIODE, 1N914	1520914	7910
D240	DIODE, 1N914	1520914	7910
D241	DIODE, 1N914	1520914	7910
D241	DIODE, 1N914	1520914	7910
D242	DIODE, 1N914	1520914	7910

MODEL100 CONTINUED

PART	DESCRIPTION	EXACT NO	MFG
D243	DIODE, 1N914	1520914	7910
D244	DIODE, 1N914	1520914	7910
D245	DIODE, 1N914	1520914	7910
D250	DIODE, 1N914	1520914	7910
D251	DIODE, 1N914	1520914	7910
D341	DIODE, 1N914	1520914	7910
D360	DIODE, 1N914	1520914	7910
D361	DIODE, 1N751A	1520751	75042
D370	DIODE, SELECTED	1530016	10597
D371	DIODE, SELECTED	1530016	10597
D373	DIODE, SELECTED	1530016	10597
D375	DIODE, SELECTED	1530016	10597
D377	DIODE, SELECTED	1530016	10597
D379	DIODE, SELECTED	1530016	10597
D388	DIODE, SELECTED	1530016	10597
D600	DIODE, 1N914	1520914	7910
D610	DIODE, 1N914	1520914	7910
D620	DIODE, 1N914	1520914	7910
D624	DIODE, 1N753A	1520753	1295
D630	DIODE, 1N914	1520914	7910
D634	DIODE, 1N753A	1520753	1295
D640	DIODE, 1N914	1520914	7910
D641	DIODE, 1N914	1520914	7910
D642	DIODE, 1N914	1520914	7910
D650	DIODE, 1N914	1520914	7910
D651	DIODE, 1N914	1520914	7910
D652	DIODE, 1N914	1520914	7910
D741	DIODE, 1N914	1520914	7910
D742	DIODE, 1N914	1520914	7910
D761	DIODE, 1N914	1520914	7910
D762	DIODE, 1N914	1520914	7910
D790	DIODE, 1N914	1520914	7910
D795	DIODE, 1N914	1520914	7910
D800	DIODE, 1N914	1520914	7910
D810	DIODE, 1N914	1520914	7910
D820	DIODE, 1N753A	1520753	1295
D821	DIODE, 1N914	1520914	7910
D830	DIODE, 1N753A	1520753	1295
D831	DIODE, 1N914	1520914	7910
D840	DIODE, 1N914	1520914	7910
D841	DIODE, 1N914	1520914	7910
D841	DIODE, 1N914	1520914	7910
D842	DIODE, 1N914	1520914	7910
D842	DIODE, 1N914	1520914	7910
D845	DIODE, 1N914	1520914	7910
D846	DIODE, 1N914	1520914	7910
D850	DIODE, 1N914	1520914	7910
D851	DIODE, 1N914	1520914	7910
D851	DIODE, 1N914	1520914	7910
D852	DIODE, 1N914	1520914	7910
D852	DIODE, 1N914	1520914	7910
D855	DIODE, 1N914	1520914	7910
D856	DIODE, 1N914	1520914	7910
D901	RECTIFIER BRIDGE, MDA920A	1520920	4713

MODEL100 CONTINUED

PART	DESCRIPTION	EXACT NO	MFG
D911	DIODE, 1N4001	1524001	1295
D940	DIODE, 1N914	1520914	7910
D941	DIODE, 1N4001	1524001	1295
D974	DIODE, 1N4001	1524001	1295
F901	FUSE, 3AG 1/4 AMP SLO-BLO	1590025	71400
J615	CONNECTOR, BNC	1310047	91836
J867	CONNECTOR, BNC	1310047	91836
K615	RELAY, REED 24 VOLT	2600304	71482
L023	BEAD, FERRITE G303	1140034	1121
L394	CHOKE, 4.7 MICROHENRY	1140033	76493
L600	BEAD, FERRITE G303	1140034	1121
L615	BEAD, FERRITE G303	1140034	1121
L741	BEAD, FERRITE G303	1140034	1121
L765	BEAD, FERRITE G303	1140034	1121
L790	BEAD, FERRITE G303	1140034	1121
L797	BEAD, FERRITE G303	1140034	1121
L820	BEAD, FERRITE G303	1140034	1121
L830	BEAD, FERRITE G303	1140034	1121
P901	POWER CORD, 3 WIRE	1750203	10597
Q100	TRANSISTOR, 2N4416	1564416	4713
Q110	TRANSISTOR, 2N5454	1565454	61637
Q120	TRANSISTOR, 2N4250	1564250	7263
Q130	TRANSISTOR, 2N4250	1564250	7263
Q140	TRANSISTOR, TIS87	1560087	1295
Q150	TRANSISTOR, MPS6543	1566543	4713
Q160	TRANSISTOR, 2N4121	1564121	7263
Q170	TRANSISTOR, TIS87	1560087	1295
Q180	TRANSISTOR, 2N4121	1564121	7263
Q200	TRANSISTOR, 2N706	1560706	94145
Q210	TRANSISTOR, TIS87	1560087	1295
Q220	TRANSISTOR, TIS87	1560087	1295
Q230	TRANSISTOR, 2N4121	1564121	7263
Q240	TRANSISTOR, 2N4121	1564121	7263
Q300	TRANSISTOR, 2N5245	1565245	1295
Q310	TRANSISTOR, 2N4045	1564045	7263
Q320	TRANSISTOR, 2N4250	1564250	7263
Q330	TRANSISTOR, 2N4250	1564250	7263
Q340	TRANSISTOR, TIS87	1560087	1295
Q350	TRANSISTOR, MPS6543	1566543	4713
Q360	TRANSISTOR, 2N4121	1564121	7263
Q370	TRANSISTOR, 2N2219	1562219	1295
Q380	TRANSISTOR, 2N2905	1562905	1295
Q390	TRANSISTOR, TIS87	1560087	1295
Q395	TRANSISTOR, 2N4121	1564121	7263
Q600	TRANSISTOR, TIS87	1560087	1295
Q610	TRANSISTOR, 2N4121	1564121	7263
Q620	TRANSISTOR, TIS87	1560087	1295
Q630	TRANSISTOR, 2N4121	1564121	7263
Q640	TRANSISTOR, 2N4121	1564121	7263
Q650	TRANSISTOR, TIS87	1560087	1295
Q700	TRANSISTOR, 2N5245	1565245	1295
Q710	TRANSISTOR, 2N4045	1564045	7263
Q720	TRANSISTOR, 2N4250	1564250	7263
Q730	TRANSISTOR, 2N4250	1564250	7263

MODEL100 CONTINUED

PART	DESCRIPTION	EXACT NO	MFG
Q740	TRANSISTOR, TIS87	1560087	1295
Q750	TRANSISTOR, MPS6543	1566543	4713
Q760	TRANSISTOR, 2N4121	1564121	7263
Q770	TRANSISTOR, TIS87	1560087	1295
Q780	TRANSISTOR, 2N4121	1564121	7263
Q790	TRANSISTOR, TIS87	1560087	1295
Q795	TRANSISTOR, 2N4121	1564121	7263
Q800	TRANSISTOR, TIS87	1560087	1295
Q810	TRANSISTOR, 2N4121	1564121	7263
Q820	TRANSISTOR, 2N2219	1562219	1295
Q830	TRANSISTOR, 2N2905	1562905	1295
Q840	TRANSISTOR, 2N2219	1562219	1295
Q845	TRANSISTOR, 2N2219	1562219	1295
Q850	TRANSISTOR, 2N2905	1562905	1295
Q855	TRANSISTOR, 2N2905	1562905	1295
Q910	TRANSISTOR, 2N5190	1565190	4713
Q920	INTEGRATED CIRCUIT, UA723	1580012	7263
Q930	TRANSISTOR, 2N4121	1564121	7263
Q940	TRANSISTOR, 2N4121	1564121	7263
Q950	TRANSISTOR, TIS87	1560087	1295
Q960	TRANSISTOR, 2N5193	1565193	4713
Q970	TRANSISTOR, TIS87	1560087	1295
R010	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R011	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R012	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R013	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R014	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R015	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R016	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R017	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R018	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R019	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R020	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R021	RESISTOR, 100 OHM 1/8W 1% METAL FILM	3181000	7115
R023	POTENTIOMETER, 250 OHM 2W	3110015	1121
R024	RESISTOR, 34800 OHM 1/4W 1% METAL FILM	3133482	7115
R025	RESISTOR, 348K OHM 1/4W 1% METAL FILM	3133483	7115
R026	RESISTOR, 3500K OHM 1/2W 1% DEP. CARBON	3093504	75042
R027	RESISTOR, 523 OHM 1/4W 1% METAL FILM	3135230	7115
R102	RESISTOR, SELECTED VALUE		
R103	RESISTOR, 68 OHM 1/4W 5% CARBON	3070680	1121
R104	RESISTOR, 10K OHM 1/4W 5% CARBON	3070103	1121
R110	RESISTOR, 324K OHM 1/4W 1% METAL FILM	3133243	7115
R111	RESISTOR, 332 OHM 1/4W 1% METAL FILM	3133320	7115
R112	RESISTOR, 10000 OHM 1/4W 1% METAL FILM	3131002	7115
R113	RESISTOR, 16500 OHM 1/4W 1% METAL FILM	3131652	7115
R114	POTENTIOMETER, 5K OHM 15T PC	3110084	19701
R115	RESISTOR, 16500 OHM 1/4W 1% METAL FILM	3131652	7115
R116	RESISTOR, 1000 OHM 1/4W 5% CARBON	3070102	1121
R117	RESISTOR, 274K OHM 1/4W 1% METAL FILM	3132743	7115
R118	RESISTOR, 274K OHM 1/4W 1% METAL FILM	3132743	7115
R129	RESISTOR, 15K OHM 1/4W 5% CARBON	3070153	1121
R130	RESISTOR, 11K OHM 1/4W 5% CARBON	3070113	1121
R140	RESISTOR, 5600 OHM 1/4W 5% CARBON	3070562	1121

MODEL100 CONTINUED

PART	DESCRIPTION	EXACT NO	MFG
R141	RESISTOR, 270 OHM 1/2W 5% CARBON	3010271	1121
R143	RESISTOR, 100K OHM 1/4W 5% CARBON	3070104	1121
R149	RESISTOR, 160 OHM 1/4W 5% CARBON	3070161	1121
R150	RESISTOR, 4300 OHM 1/4W 5% CARBON	3070432	1121
R160	RESISTOR, 360 OHM 1/4W 5% CARBON	3070361	1121
R161	RESISTOR, 51 OHM 1/4W 5% CARBON	3070510	1121
R165	RESISTOR, 270 OHM 1/2W 5% CARBON	3010271	1121
R171	RESISTOR, 22 OHM 1/4W 5% CARBON	3070220	1121
R181	RESISTOR, 22 OHM 1/4W 5% CARBON	3070220	1121
R182	RESISTOR, 47 OHM 1/4W 5% CARBON	3070470	1121
R183	RESISTOR, 604 OHM 1/4W 1% METAL FILM	3136040	7115
R184	RESISTOR, 390 OHM 1/4W 5% CARBON	3070391	1121
R185	RESISTOR, 402 OHM 1/4W 1% METAL FILM	3134020	7115
R200	RESISTOR, 2210 OHM 1/4W 1% METAL FILM	3132211	7115
R201	RESISTOR, 10K OHM 1/4W 5% CARBON	3070103	1121
R202	RESISTOR, 3010 OHM 1/4W 1% METAL FILM	3133011	7115
R203	RESISTOR, 22 OHM 1/2W 5% CARBON	3010220	1121
R214	RESISTOR, 4220 OHM 1/4W 1% METAL FILM	3134221	7115
R220	RESISTOR, 332 OHM 1/4W 1% METAL FILM	3133320	7115
R221	RESISTOR, 6190 OHM 1/4W 1% METAL FILM	3136191	7115
R222	RESISTOR, 5620 OHM 1/4W 1% METAL FILM	3135621	7115
R223	POTENTIOMETER, 1K OHM 15T PC	3110082	19701
R224	RESISTOR, 4220 OHM 1/4W 1% METAL FILM	3134221	7115
R230	RESISTOR, 2700 OHM 1/4W 5% CARBON	3070272	1121
R235	RESISTOR, 22 OHM 1/2W 5% CARBON	3010220	1121
R239	RESISTOR, 820 OHM 1/4W 5% CARBON	3070821	1121
R240	RESISTOR, 2700 OHM 1/4W 5% CARBON	3070272	1121
R240	POTENTIOMETER, 1K OHM SUBMIN	3110138	80294
R241	RESISTOR, 5620 OHM 1/4W 1% METAL FILM	3135621	7115
R242	POTENTIOMETER, 10K OHM SUBMIN	3110135	80294
R243	RESISTOR, 37400 OHM 1/4W 1% METAL FILM	3133742	7115
R244	POTENTIOMETER, 10K OHM SUBMIN	3110135	80294
R245	RESISTOR, 24900 OHM 1/4W 1% METAL FILM	3132492	7115
R250	POTENTIOMETER, 1K OHM SUBMIN	3110138	80294
R251	RESISTOR, 5620 OHM 1/4W 1% METAL FILM	3135621	7115
R252	POTENTIOMETER, 10K OHM SUBMIN	3110135	80294
R253	RESISTOR, 37400 OHM 1/4W 1% METAL FILM	3133742	7115
R254	POTENTIOMETER, 10K OHM SUBMIN	3110135	80294
R255	RESISTOR, 24900 OHM 1/4W 1% METAL FILM	3132492	7115
R300	POTENTIOMETER, 200 OHM SUBMIN	3110134	80294
R301	RESISTOR, 715 OHM 1/4W 1% METAL FILM	3137150	7115
R302	RESISTOR, SELECTED VALUE		
R303	RESISTOR, 68 OHM 1/4W 5% CARBON	3070680	1121
R304	RESISTOR, 10K OHM 1/4W 5% CARBON	3070103	1121
R310	RESISTOR, 324K OHM 1/4W 1% METAL FILM	3133243	7115
R311	RESISTOR, 332 OHM 1/4W 1% METAL FILM	3133320	7115
R312	RESISTOR, 10000 OHM 1/4W 1% METAL FILM	3131002	7115
R313	RESISTOR, 16500 OHM 1/4W 1% METAL FILM	3131652	7115
R314	POTENTIOMETER, 10K OHM SUBMIN	3110135	80294
R315	RESISTOR, 16500 OHM 1/4W 1% METAL FILM	3131652	7115
R316	RESISTOR, 240 OHM 1/4W 5% CARBON	3070241	1121
R317	RESISTOR, 274K OHM 1/4W 1% METAL FILM	3132743	7115
R318	RESISTOR, 274K OHM 1/4W 1% METAL FILM	3132743	7115
R329	RESISTOR, 12K OHM 1/4W 5% CARBON	3070123	1121

MODEL100 CONTINUED

PART	DESCRIPTION	EXACT NO	MFG
R330	RESISTOR, 11K OHM 1/4W 5% CARBON	3070113	1121
R340	RESISTOR, 5600 OHM 1/4W 5% CARBON	3070562	1121
R341	RESISTOR, 22 OHM 1/2W 5% CARBON	3010220	1121
R343	RESISTOR, 100K OHM 1/4W 5% CARBON	3070104	1121
R349	RESISTOR, 160 OHM 1/4W 5% CARBON	3070161	1121
R350	RESISTOR, 4300 OHM 1/4W 5J CARBON	3070432	1121
R360	RESISTOR, 360 OHM 1/4W 5% CARBON	3070361	1121
R361	RESISTOR, 51 OHM 1/4W 5% CARBON	3070510	1121
R365	RESISTOR, 22 OHM 1/2W 5% CARBON	3010220	1121
R370	RESISTOR, 820 OHM 1/4W 5% CARBON	3070821	1121
R370	RESISTOR, 1500 OHM 1/4W 1% METAL FILM	3131501	7115
R371	RESISTOR, 13.7 OHM 1/8W 1% METAL FILM	3180137	7115
R380	RESISTOR, 820 OHM 1/4W 5% CARBON	3070821	1121
R381	RESISTOR, 13.7 OHM 1/8W 1% METAL FILM	3180137	7115
R388	RESISTOR, 1470 OHM 1/4W 1% METAL FILM	3131471	7115
R391	RESISTOR, 150 OHM 1/4W 5% CARBON	3070151	1121
R394	POTENTIOMETER, 100 OHM SUBMIN	3110136	80294
R395	RESISTOR, 22 OHM 1/4W 5% CARBON	3070220	1121
R396	RESISTOR, 150 OHM 1/4W 5% CARBON	3070151	1121
R600	RESISTOR, 5600 OHM 1/4W 5% CARBON	3070562	1121
R601	RESISTOR, 22 OHM 1/4W 5% CARBON	3070220	1121
R602	RESISTOR, 150 OHM 1/4W 5% CARBON	3070151	1121
R610	RESISTOR, 5600 OHM 1/4W 5% CARBON	3070562	1121
R611	RESISTOR, 22 OHM 1/4W 5% CARBON	3070220	1121
R612	RESISTOR, 150 OHM 1/4W 5% CARBON	3070151	1121
R615	RESISTOR, 620 OHM 1/4W 5% CARBON	3070621	1121
R620	RESISTOR, 150 OHM 1/4W 5% CARBON	3070151	1121
R622	RESISTOR, 2700 OHM 1/4W 5% CARBON	3070272	1121
R623	RESISTOR, 2200 OHM 1/4W 5% CARBON	3070222	1121
R624	RESISTOR, 1800 OHM 1/4W 5% CARBON	3070182	1121
R630	RESISTOR, 150 OHM 1/4W 5% CARBON	3070151	1121
R632	RESISTOR, 2700 OHM 1/4W 5% CARBON	3070272	1121
R633	RESISTOR, 2200 OHM 1/4W 5% CARBON	3070222	1121
R634	RESISTOR, 1300 OHM 1/4W 5% CARBON	3070132	1121
R640	RESISTOR, 1000 OHM 1/4W 5% CARBON	3070102	1121
R641	RESISTOR, 12K OHM 1/4W 5% CARBON	3070123	1121
R642	RESISTOR, 100 OHM 1/4W 5% CARBON	3070101	1121
R645	RESISTOR, 2.0 OHM 1/2W 5% CARBON	3010020	1121
R650	RESISTOR, 1200 OHM 1/4W 5% CARBON	3070122	1121
R651	RESISTOR, 12K OHM 1/4W 5% CARBON	3070123	1121
R652	RESISTOR, 100 OHM 1/4W 5% CARBON	3070101	1121
R655	RESISTOR, 2.0 OHM 1/2W 5% CARBON	3010020	1121
R700	POTENTIOMETER, 100 OHM SUBMIN	3110136	80294
R701	RESISTOR, 422 OHM 1/4W 1% METAL FILM	3134220	7115
R702	RESISTOR, SELECTED VALUE		
R703	RESISTOR, 68 OHM 1/4W 5% CARBON	3070680	1121
R704	RESISTOR, 10K OHM 1/4W 5% CARBON	3070103	1121
R710	RESISTOR, 324K OHM 1/4W 1% METAL FILM	3133243	7115
R711	RESISTOR, 332 OHM 1/4W 1% METAL FILM	3133320	7115
R712	RESISTOR, 10000 OHM 1/4W 1% METAL FILM	3131002	7115
R713	RESISTOR, 16500 OHM 1/4W 1% METAL FILM	3131652	7115
R714	POTENTIOMETER, 5K OHM 15T PC	3110084	19701
R715	RESISTOR, 16500 OHM 1/4W 1% METAL FILM	3131652	7115
R716	RESISTOR, 470 OHM 1/4W 5% CARBON	3070471	1121

MODEL100 CONTINUED

PART	DESCRIPTION	EXACT NO	MFG
R717	RESISTOR, 274K OHM 1/4W 1% METAL FILM	3132743	7115
R718	RESISTOR, 274K OHM 1/4W 1% METAL FILM	3132743	7115
R729	RESISTOR, 15K OHM 1/4W 5% CARBON	3070153	1121
R730	RESISTOR, 11K OHM 1/4W 5% CARBON	3070113	1121
R740	RESISTOR, 5600 OHM 1/4W 5% CARBON	3070562	1121
R741	RESISTOR, 10 OHM 1/4W 5% CARBON	3070100	1121
R742	RESISTOR, 100 OHM 1/4W 5% CARBON	3070101	1121
R743	RESISTOR, 100K OHM 1/4W 5% CARBON	3070104	1121
R749	RESISTOR, 160 OHM 1/4W 5% CARBON	3070161	1121
R750	RESISTOR, 4300 OHM 1/4W 5% CARBON	3070432	1121
R760	RESISTOR, 360 OHM 2W 10% CARBON	3060361	1121
R761	RESISTOR, 51 OHM 1/4W 5% CARBON	3070510	1121
R765	RESISTOR, 10 OHM 1/4W 5% CARBON	3070100	1121
R771	RESISTOR, 22 OHM 1/4W 5% CARBON	3070220	1121
R781	RESISTOR, 22 OHM 1/4W 5% CARBON	3070220	1121
R782	RESISTOR, 3160 OHM 1/4W 1% METAL FILM	3133161	7115
R790	RESISTOR, 5600 OHM 1/4W 5% CARBON	3070562	1121
R791	RESISTOR, 150 OHM 1/4W 5% CARBON	3070151	1121
R792	RESISTOR, 22 OHM 1/4W 5% CARBON	3070220	1121
R795	RESISTOR, 5600 OHM 1/4W 5% CARBON	3070562	1121
R796	RESISTOR, 150 OHM 1/4W 5% CARBON	3070151	1121
R797	RESISTOR, 22 OHM 1/4W 5% CARBON	3070220	1121
R800	POTENTIOMETER, 1K OHM 2W	3110112	12697
R801	RESISTOR, 27 OHM 1/4W 5% CARBON	3070270	1121
R802	RESISTOR, 75 OHM 1/4W 5% CARBON	3070750	1121
R803	RESISTOR, 10K OHM 1/4W 5% CARBON	3070103	1121
R804	RESISTOR, 150 OHM 1/4W 5% CARBON	3070151	1121
R805	RESISTOR, 22 OHM 1/4W 5% CARBON	3070220	1121
R806	RESISTOR, 47 OHM 1/4W 5% CARBON	3070470	1121
R812	RESISTOR, 75 OHM 1/4W 5% CARBON	3070750	1121
R813	RESISTOR, 10K OHM 1/4W 5% CARBON	3070103	1121
R814	RESISTOR, 150 OHM 1/4W 5% CARBON	3070151	1121
R815	RESISTOR, 22 OHM 1/4W 5% CARBON	3070220	1121
R820	RESISTOR, 3000 OHM 1/2W 5% CARBON	3010302	1121
R821	RESISTOR, 220 OHM 1/2W 5% CARBON	3010221	1121
R822	POTENTIOMETER, 500 OHM MIN	3110069	12697
R830	RESISTOR, 3000 OHM 1/2W 5% CARBON	3010302	1121
R831	RESISTOR, 220 OHM 1/2W 5% CARBON	3010221	1121
R840	RESISTOR, 3300 OHM 1/2W 5% CARBON	3010332	1121
R841	RESISTOR, 22 OHM 1/2W 5% CARBON	3010220	1121
R842	RESISTOR, 10 OHM 1/4W 5% CARBON	3070100	1121
R846	RESISTOR, 22 OHM 1/2W 5% CARBON	3010220	1121
R847	RESISTOR, 10 OHM 1/4W 5% CARBON	3070100	1121
R848	RESISTOR, 143 OHM 1/2W 1% METAL FILM	3101430	7115
R849	RESISTOR, 143 OHM 1/2W 1% METAL FILM	3101430	7115
R850	RESISTOR, 3300 OHM 1/2W 5% CARBON	3010332	1121
R851	RESISTOR, 22 OHM 1/2W 5% CARBON	3010220	1121
R852	RESISTOR, 10 OHM 1/4W 5% CARBON	3070100	1121
R856	RESISTOR, 22 OHM 1/2W 5% CARBON	3010220	1121
R857	RESISTOR, 10 OHM 1/4W 5% CARBON	3070100	1121
R858	RESISTOR, 143 OHM 1/2W 1% METAL FILM	3101430	7115
R861	RESISTOR, 453 OHM 1/2W 1% METAL FILM	3104530	7115
R862	RESISTOR, 56.2 OHM 1/4W 1% METAL FILM	3130562	7115
R865	RESISTOR, 10.0 OHM 1/8W 1% METAL FILM	3180100	7115

MODEL100 CONTINUED

PART	DESCRIPTION	EXACT NO	MFG
R866	RESISTOR, 41.2 OHM 1/8W 1% METAL FILM	3180412	7115
R867	RESISTOR, 41.2 OHM 1/8W 1% METAL FILM	3180412	7115
R901	RESISTOR, 68K OHM 1/4W 5% CARBON	3070683	1121
R910	RESISTOR, 1.0 OHM 1/2W 5% CARBON	3010010	1121
R920	RESISTOR, 1800 OHM 1/4W 5% CARBON	3070182	1121
R921	RESISTOR, 5360 OHM 1/4W 1% METAL FILM	3135361	7115
R922	POTENTIOMETER, 1K OHM 15T PC	3110082	19701
R923	RESISTOR, 3160 OHM 1/4W 1% METAL FILM	3133161	7115
R930	RESISTOR, 1600 OHM 1/4W 5% CARBON	3070162	1121
R931	RESISTOR, 18K OHM 1/4W 5% CARBON	3070183	1121
R939	RESISTOR, 13K OHM 1/4W 5% CARBON	3070133	1121
R941	RESISTOR, 7500 OHM 1/4W 5% CARBON	3070752	1121
R942	RESISTOR, 7500 OHM 1/4W 1% METAL FILM	3137501	7115
R943	POTENTIOMETER, 200 OHM 15T TRIM	3110125	19701
R944	RESISTOR, 7500 OHM 1/4W 1% METAL FILM	3137501	7115
R950	RESISTOR, 1000 OHM 1/4W 5% CARBON	3070102	1121
R951	RESISTOR, 1600 OHM 1/4W 5% CARBON	3070162	1121
R960	RESISTOR, 100 OHM 1/4W 5% CARBON	3070101	1121
R971	RESISTOR, 15K OHM 1/4W 5% CARBON	3070153	1121
R972	RESISTOR, 13K OHM 1/4W 5% CARBON	3070133	1121
R973	RESISTOR, 1600 OHM 1/4W 5% CARBON	3070162	1121
R974	RESISTOR, 2.0 OHM 1/2W 5% CARBON	3010020	1121
S010	SWITCH, CONCENTRIC 2 POLE	2600249	10597
S011	SWITCH, ROTARY 10 POSITION	2600302	10597
S250	SWITCH, ROTARY 7 POSITION	2600303	10597
S806	SWITCH, TOGGLE DPDT	2600109	100005
S860	SWITCH, TOGGLE 3P3T	2600090	76854
S901	SWITCH, TOGGLE SPDT	2600103	100005
T901	TRANSFORMER, POWER	1200035	10597

ASSEMBY DRAWINGS

SCHEMATIC DIAGRAMS

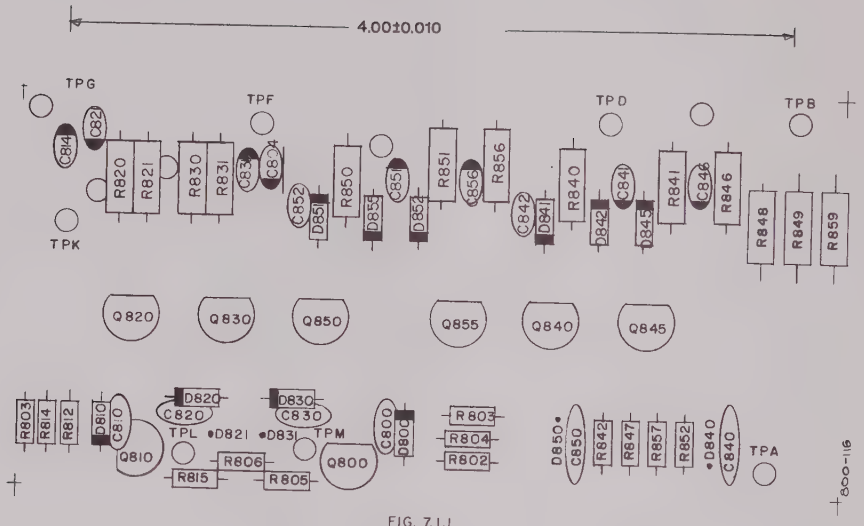


FIG. 7.1.1
PARTS LAYOUT OUTPUT BUFFER BOARD MODEL 100

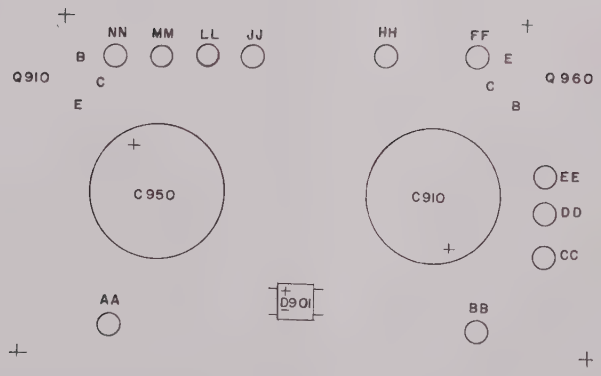


FIG. 7.1.2
PARTS LAYOUT RECTIFIER BOARD MODEL 100

JHM 9-28-65

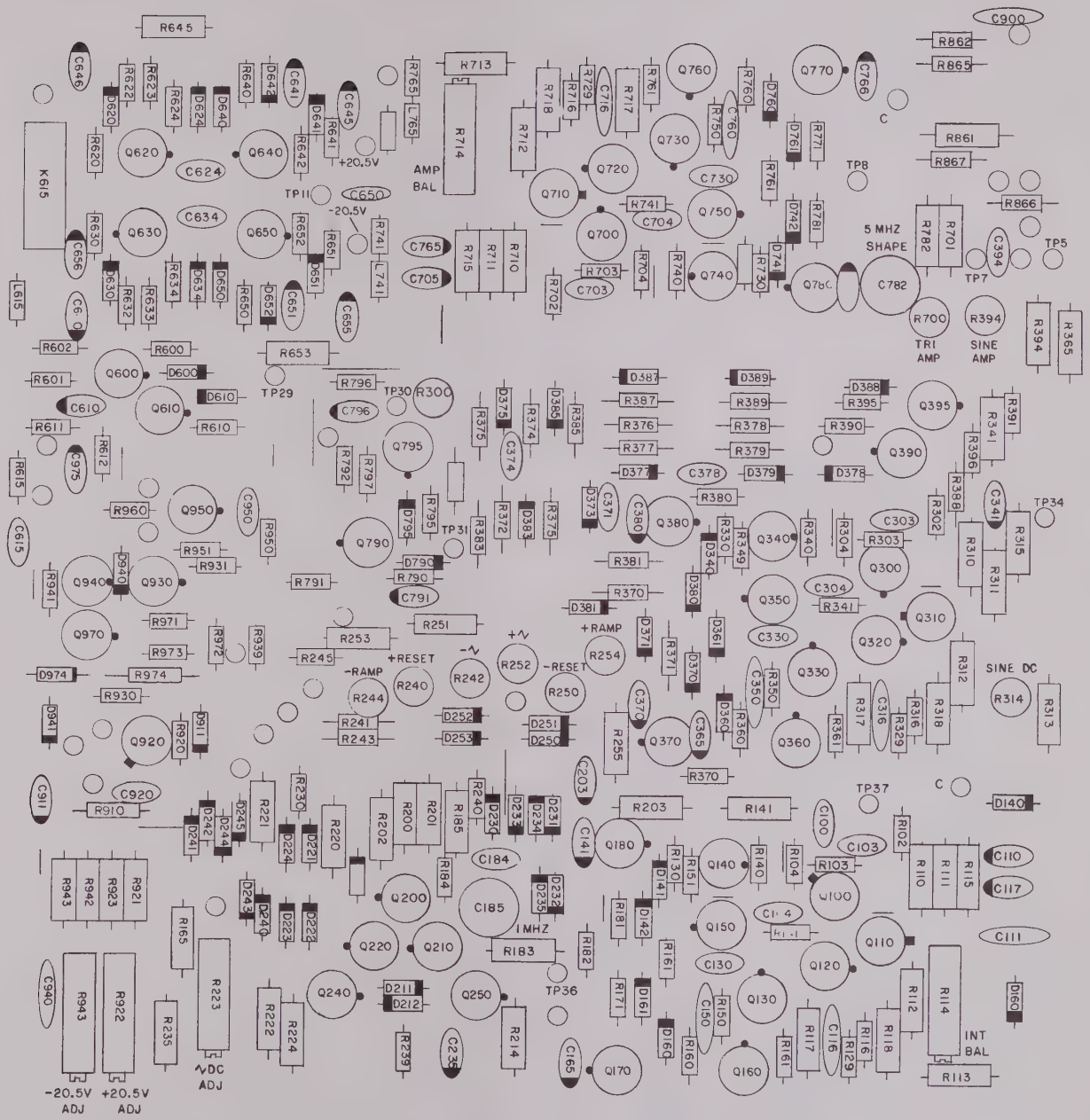
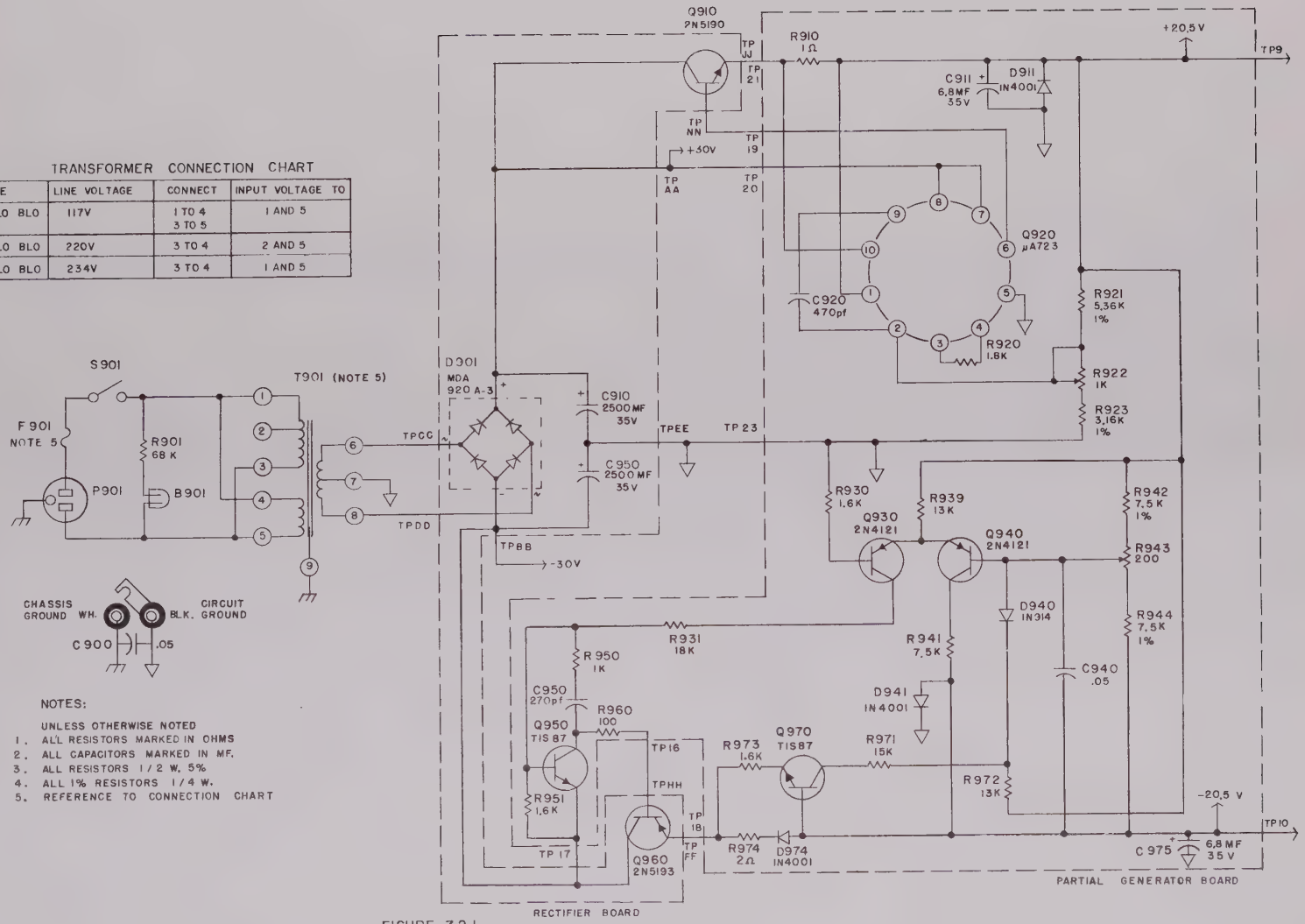


FIG. 7.1.3 PARTS LAYOUT MAIN BOARD MODEL 100

TRANSFORMER CONNECTION CHART

FUSE	LINE VOLTAGE	CONNECT	INPUT VOLTAGE TO
1/4A SLO BLO	117V	1 TO 4 3 TO 5	1 AND 5
1/8A SLO BLO	220V	3 TO 4	2 AND 5
1/8A SLO BLO	234V	3 TO 4	1 AND 5

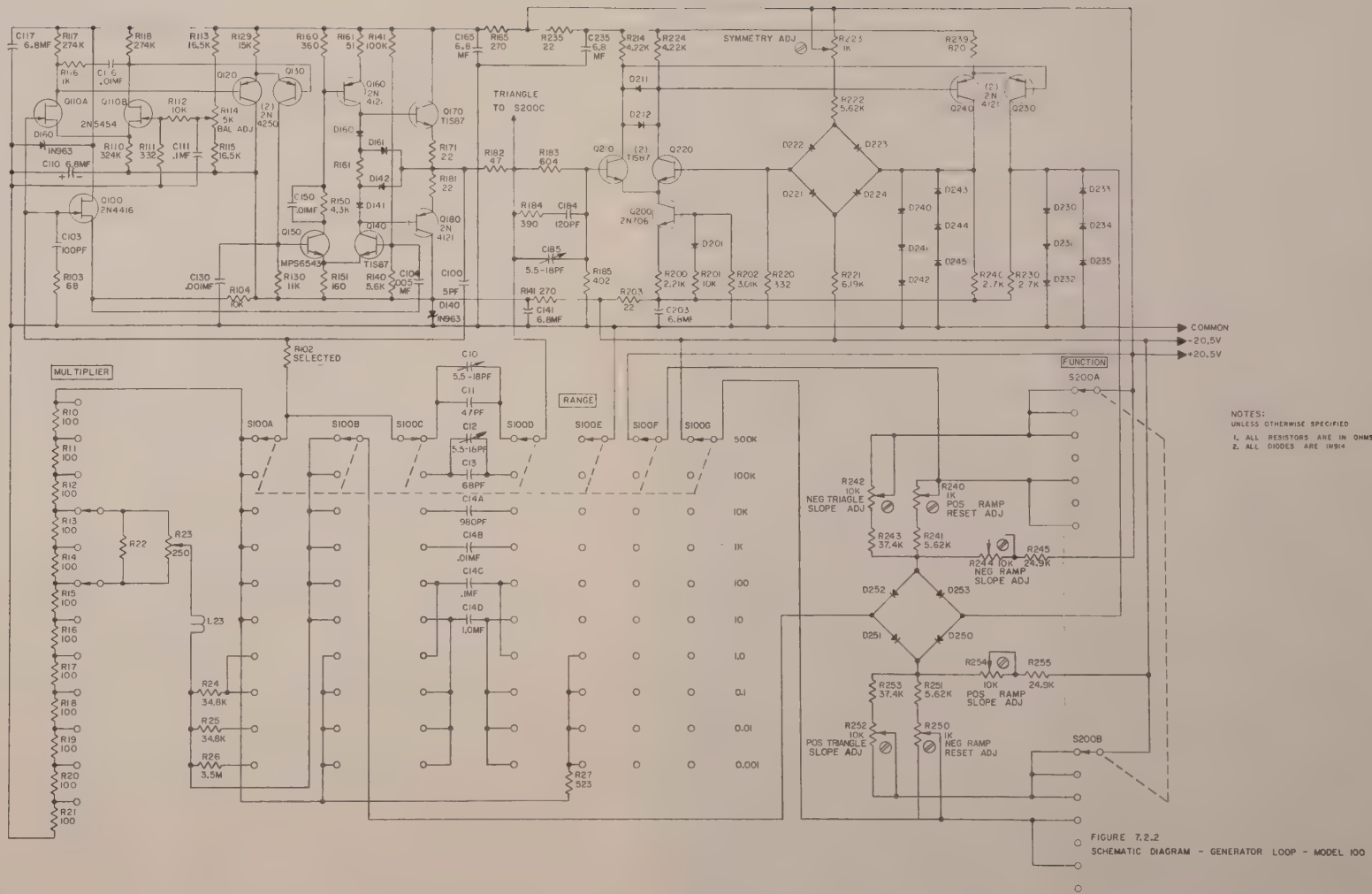


NOTES:

UNLESS OTHERWISE NOTED
1. ALL RESISTORS MARKED IN OHMS
2. ALL CAPACITORS MARKED IN MF.
3. ALL RESISTORS 1/2 W. 5%
4. ALL 1% RESISTORS 1/4 W.
5. REFERENCE TO CONNECTION CHART

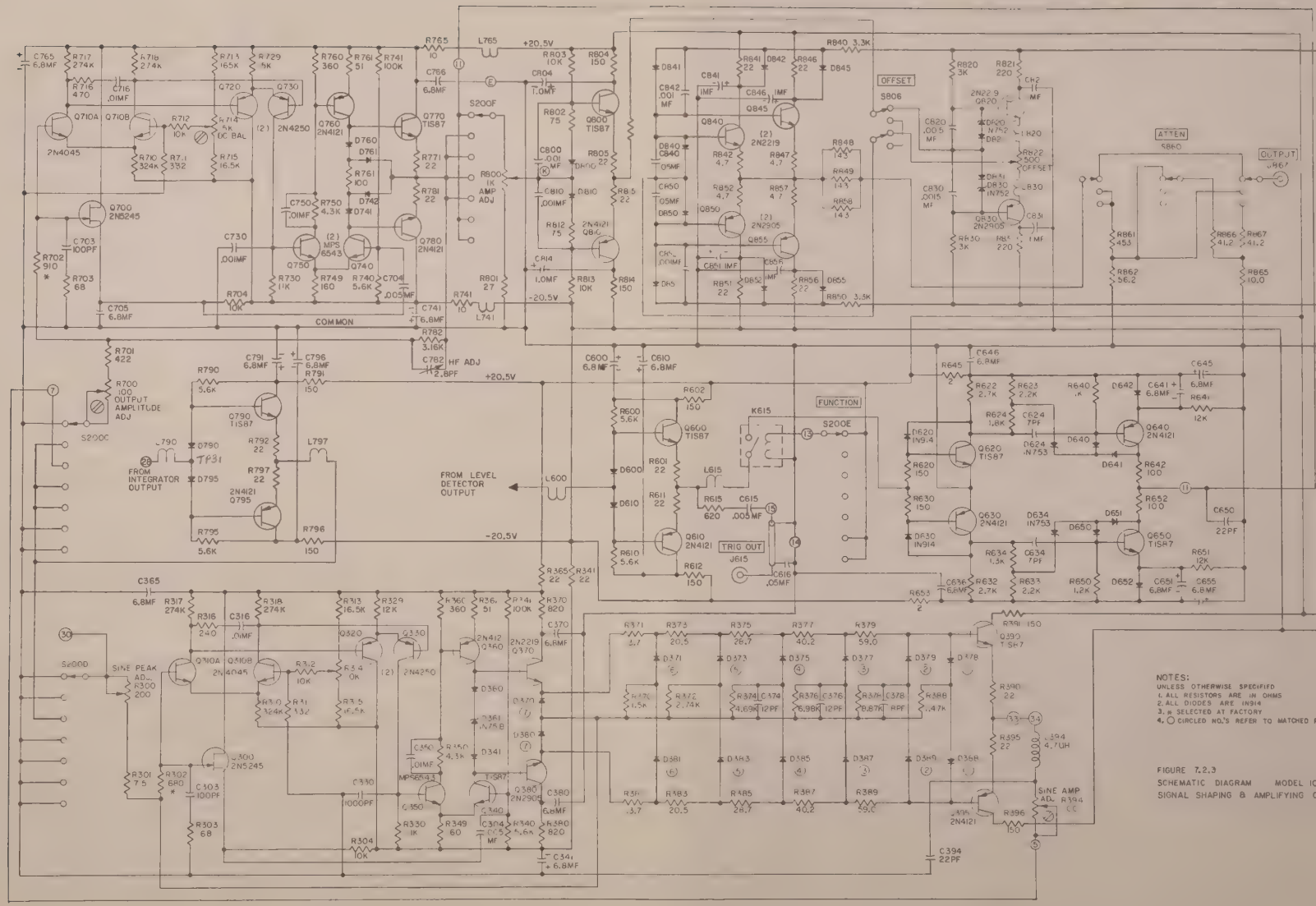
FIGURE 7.2.1
SCHEMATIC DIAGRAM - POWER SUPPLY - MODEL 100

JHM 9-17-69



NOTES:
UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE IN OHMS
2. ALL DIODES ARE IN914

FIGURE 7.2.2
SCHEMATIC DIAGRAM - GENERATOR LOOP - MODEL 100



NOTES:
UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE IN OHMS
2. ALL DIODES ARE IN914
3. ⊕ SELECTED AT FACTORY
4. ○ CIRCLED NO.'S REFER TO MATCHED PAIRS

FIGURE 7.2.3
SCHEMATIC DIAGRAM MODEL 100
SIGNAL SHAPING & AMPLIFYING CIRCUITS

REPRESENTATIVES

EASTERN U.S.

Martin P. Andrews, Inc.	
319 Mott Road, Fayetteville, N.Y. 13066 (315) 637-6405	New York State (not NYC)
Beacon Electronic Associates, Inc.	
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Letronix	
251 W. DeKalb Pike, King of Prussia, Pa. 19406 (215) 265-1020	E. Pa., S. New Jersey
Measurement Technology, Inc.	
295 Northern Blvd., Great Neck, N.Y. 11021 (516) 482-3500	N. New Jersey NYC, L.I.,
Scientific Marketing Associates	
8817 Hunting Lane, Laurel, Md. 20810 (301) 776-5130	Del, Md, Wash. D.C., Va. (Loudon-Fairfax)
Technical Marketing Associates	
5100 N. Glen Drive, Raleigh, N.C. 27609 (919) 787-7244	N and S Carolinas Virginia (not Loudon-Fairfax)
Technitron Instruments, Inc.	
23203 Lorain Rd., N. Olmsted, Ohio 44070 (216) 734-0960	Ohio
1250 W. Dorothy Lane, Dayton, Ohio 45409 (513) 298-9964	Ohio
13657 Grand River Avenue, Detroit, Michigan 48227 (313) 838-7324	Michigan
114 Spring Grove Rd., Pittsburgh, Pa. 15235 (412) 371-1231	W. Pa., W. Virginia

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Bard Associates, Inc.	
La Grange Industrial Park, La Grange, Ill. 60526 (312) 354-0660	Ill, Iowa, Wisc.
4000 Meadows Dr., Indianapolis, Ind. 46205 (317) 547-3113	Indiana
4640 W. 77th, Minnapolis, Minn. 55435 (612) 922-8233	Minnesota
50 Crestwood Executive Ctr., Crestwood, Mo. 63126 (314) 849-0080	Missouri
13100 W. 95th, Lenexa, Kansas 66215 (913) 888-2673	Kansas
Southwest Electronic Industries, Inc.	
621 Meadows Bldg, Dallas, Tex. 75206 (214) 363-1671	N. Texas, N. La.
1405 S. Post Oak Rd., Houston, Tex. 77027 (713) 621-3760	S. Texas, S. La.
2015-C S. Lakewood, Tulsa, Okla. 74112 835-2481	Oklahoma, Arkansas

Nov. 1969

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The Abco Company	
555 W. Ninth, San Pedro, Calif 90731 (213) 833-8333	S. California
4333 Dawson Ave., San Diego, Calif 92115 (714) 286-7474	
Hyer Associates, Inc.	Colorado, Mont.,
8101 E. Prentice Ave., Englewood, Colo 80110 (303) 771-5424	Idaho, Wyoming
130 Alvarado N.E., Albuquerque, N.M. 87108 (505) 265-5961	New Mexico
2896 S. Main, Salt Lake City, Utah 84115 (801) 487-7747	Utah
The Mauldin Company	
437 California Ave., Palo Alto, Calif 94306 (415) 326-5291	N. California
Measurement Consultants	
P.O. Box 11099, Phoenix, Arizona 85017 (602) 264-1279	Arizona
Exact Electronics, Inc.	
P.O. Box 160, Hillsboro, Oregon 97123 (503) 648-6661	Oregon, Washington

CANADA

Atlas Instrument Corporation, Ltd.	
50 Wingold Avenue, Toronto 19, Ontario (416) 781-6175	
3333 Cavendish Blvd., Montreal, Quebec (514) 489-8495	

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Electronic Associates, Pty Ltd., 48 Atchison St., St. Leonards NSW 2065	Australia
Inglomark Markowitsch and Co., Mariahilfer Strasse 133, Wien WV	Austria
Regulation-Mesure sprl, 73 Avenue R. Vandendriessche, Bruxelles 15	Belgium
Ambries SA, Ave. Grace Aranha, 226-60, Rio de Janeiro	Brazil
Pentz and Cia, Ltda., Casilla 2839, Santiago	Chile
ScMetric A/S, Rundforbivej 186, 2850 Naerum	Denmark
Environmental Equipments, Ltd., Denton Road, Wokingham, Berkshire	England
Into O/Y, P.O. Box 10153, 11 Maritullinkatu, Helsinki	Finland
Tranchant Electronique, 19 Rue Madame de Sanzillon, 92 Clichy	France
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Industrial Agencies, 111 Mahatma Gandhi Road, Bombay 1	India
Abdul Masih E. Jwaideh, 85 Saadun St., Bagdad	Iraq
Eastronics, Ltd., 75 Haifa Rd., P.O. Box 21029, Tel Aviv	Israel
Silverstar Ltd., Via Dei Gracchi 20, 20146 Milano	Italy
Fredin, S.A., P.O. Box 53-958, Mexico 17 D.F.	Mexico
C. N. Rood n.v., P.O. Box 4542, Rijswijk (Z.H.)	The Netherlands
W and K McLean, Ltd., P.O. Box 3097, Auckland	New Zealand
G.P.O. 496, Wellington 1	New Zealand
Metric A.S., P.B. 80, Bekkelagshgd, Kongsveien 91, Oslo	Norway
Pakland Corporation, Central Commercial Area, Karachi 29	Pakistan
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